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Herding territories in Northern Cameroon and Western Burkina Faso: spatial arrangements and herd management

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Abstract

In Sudano-Sahelian Africa, Fulani pastoralists who settled down massively in less densely populated zones during the 1970s and 1980s have recently increased the mobility of their herds in response to an extension of cropping areas, a shortage of pasture and problems resulting from crop damage by cattle. Today, they annually exploit a set of areas located both near to and far from their dwellings that constitutes their 'herding territory'. This article aims to clarify how Fulani pastoralists conceive, organize and manage their herding territory and to discuss the future of pastoralism within the local and regional legal framework. The study was carried out in northern Cameroon and western Burkina Faso over three years following a participatory research approach. The results show that the herding territory is mainly composed of three sub-elements endowed with different access rights: the 'attachment territory' and 'peripheral territory', with rangelands that are exploited by 'house herds' on a daily basis, and the 'territories distant from the residential area' that serve for transhumance and the relocation of a second group of herds known as the 'bush herd'. These territories and herds are managed by mobilizing local knowledge and juggling a combination of factors, including the availability of plant biomass on different pastoral units, access rights and agreements with local stakeholders regarding resources, the date the rains arrive and the progress of sowing and harvesting in the fields. If pastoral systems are to be maintained in a sustainable manner in this region, any change to existing spatial arrangements must take into account the knowledge, expectations and needs of pastoralists on one hand and the evolving legal and institutional framework in western Africa on the other.

Keywords: Territory, Livestock, Fulani pastoralists, Sudano-Sahelian Africa, Northern Cameroon, Western Burkina Faso, Decentralization, Pastoral law

Background

Over the past 30 years, Fulani pastoralists (former nomads) have settled down massively near less densely populated villages of farmers in Sudano-Sahelian zones (Gallais 1979; Niamir-Fuller 1998; Swift et al. 1996; Bassett and Turner 2007). Although they own the majority of livestock on these host territories, the pastoralists account for a small portion of the population and continue to have few property rights, leading to

their continuing marginalization (Bassett 2009; Benjaminsen and Ba 2009; Dongmo et al. 2012).

The recent expansion of cropping areas by farmers (mostly migrants) has led to a significant restriction of pastoral areas, making the movement of herds very difficult and significantly reducing forage supply for herds, especially during the rainy season (Turner et al. 2005; Dongmo et al. 2007; Vall and Diallo 2009). Competition over resources has increased, conflicts between farmers and pastoralists have become more frequent and resources are threatened (Dugué et al. 2004; Kiéma 2007; Benjaminsen and Ba 2009; Weber and Horst 2011).

Faced with a shortage of pasture, an absence of fodder crops and problems of crop damage by cattle inside or near to their home territory, these settled pastoralists recently have been forced to increase the mobility of some of their animals (Dongmo et al. 2007; Adriansen 2008; Moritz et al. 2010). Mobility thus remains a defining feature of these pastoralists' strategies, which combine daily movements with minor and major transhumance depending on varying opportunities and constraints (Scoones 1995; Turner et al. 2005; Bassett 2009; Moritz 2010). Cattle mobility also relies on relations between individuals and groups of pastoralists with different economic statuses (Okayasu et al. 2010). Pastoralists, individually and collectively, build 'herding territories' with contours that change with the seasons and according to forage availability and agreements with landowners (or customary authorities).

Studies of the mobility of Sudano-Sahelian herds have focused on the management of spaces and resources rather than on understanding herding territories as entities built and managed by pastoralists. The aim of this article is to identify the socio-economic, organizational and agro-ecological factors determining the boundaries and functioning of these herding territories and the sustainable management of pastoral resources and herds. The research on which the article is based was conducted in northern Cameroon and western Burkina Faso.

The concept of 'territory' regarding agriculture and herding

In this article, the concept of territory is understood in the broad sense. A territory is a 'socialized space' (Benoît et al. 2006), a social creation subject to changes in its human, economic and political environment (Caron 2005; Gautier et al. 2005), which has more or less well-defined contours and boundaries. Over time, inhabitants of a territory can develop a sense of belonging and form a community with a governing authority recognized by its members and organization and management rules (Brunet et al. 1993). In this broad sense, a territory may be built by gaining rights of access and use of resources through regular practices such as herding on the same geographical area, and its boundaries may evolve in response to changes in these rights and the availability of resources (Retaillé 2005).

In sub-Saharan Africa, the concept of 'village territory' (*terroir villageois* in French) has been popularized by tropical geographers (Sautter and Pelissier 1964; Seignobos 1995) studying agrarian structures. On each village territory, agricultural territory and herding territory are separated: crops are located near to or not far from dwellings, while livestock and rangelands are based on the periphery and sometimes on spaces whose ownership is undefined or in areas between two village territories. The concept

of village territory and associated analytic tools are applicable to long-established rural societies which are focused on crop production and have strong links to ancestral lands. In savannah areas with high population densities that are characterized by human and livestock migration movements, this schematic representation of territorial organization has evolved greatly because cultivated fields are now integrated into networks of areas dedicated to pasture. These areas are managed by several stakeholders who do not belong to the same village and who are not all pursuing the same goals. The concept of 'herding territory' could therefore be helpful to determine the set of areas and resources that constitute an action space for pastoralism (Painter et al. 1994; Turner 1999).

Study area

The study was carried out from 2005 to 2008 in two village territories located in cotton-growing regions of Sudano-Sahelian Africa (Figure 1): Ourolabo III, in northern Cameroon, and Koumbia-Waly, in western Burkina Faso.

The territory of Ourolabo III, established in 1983, has 1,200 inhabitants. The majority are migrant farmers from the Moudang, Guidar and Guiziga ethnic groups, and about 20% are Fulani pastoralists. The territory covers 13.5 km^2, 10 km^2 of which are managed by groups of migrant farmers (Ourolabo village) and 3.5 km^2 by Fulani pastoralists (Ourobocki and Kassalabouté encampments). The territory of Koumbia-Waly covers 91 km^2 and has about 6,000 inhabitants, including people from the native Bwaba ethnic group and Mossi and Fulani migrants. The territory is composed of two major residential areas (Koumbia and Waly) and three Fulani pastoralist encampments (Alawali, Weltare and Dianweli).

There is strong human pressure on the agro-sylvopastoral resources in the study sites. In Ourolabo III and in Koumbia-Waly, the population densities are respectively 88 and 66 inhabitants/km^2, the agricultural areas are 76% and 53% of the total area, and the stocking density can reach 48 to 150 Tropical livestock units (TLU)/km^2 when all of the herds return from transhumance.

Methods

Spatial analysis of territory organization

In both territories, a preliminary diagnosis was made in 2005 with various socio-professional groups (pastoralists, farmers, local authorities) that involved group discussions and individual interviews. The aim was to understand how pastoralists perceive and represent the organization of the spaces that they exploit for their housing, crops and herds. The limits and contours of the areas on the territory used for herding were specified to evaluate the space and resources available, with questions posed as to who had access to them and how they were used.

Additional in-depth surveys with 45 pastoralists from each territory studied were used to explore the knowledge and strategies of Fulani pastoralists regarding the management of pastoral resources in time and space, their practices and the corresponding management modes of individual and collective resources. The elements used by pastoralists to classify time (pastoral calendar), grazing lands (pastoral units) and the herd management rules associated with each of these elements also were characterized.

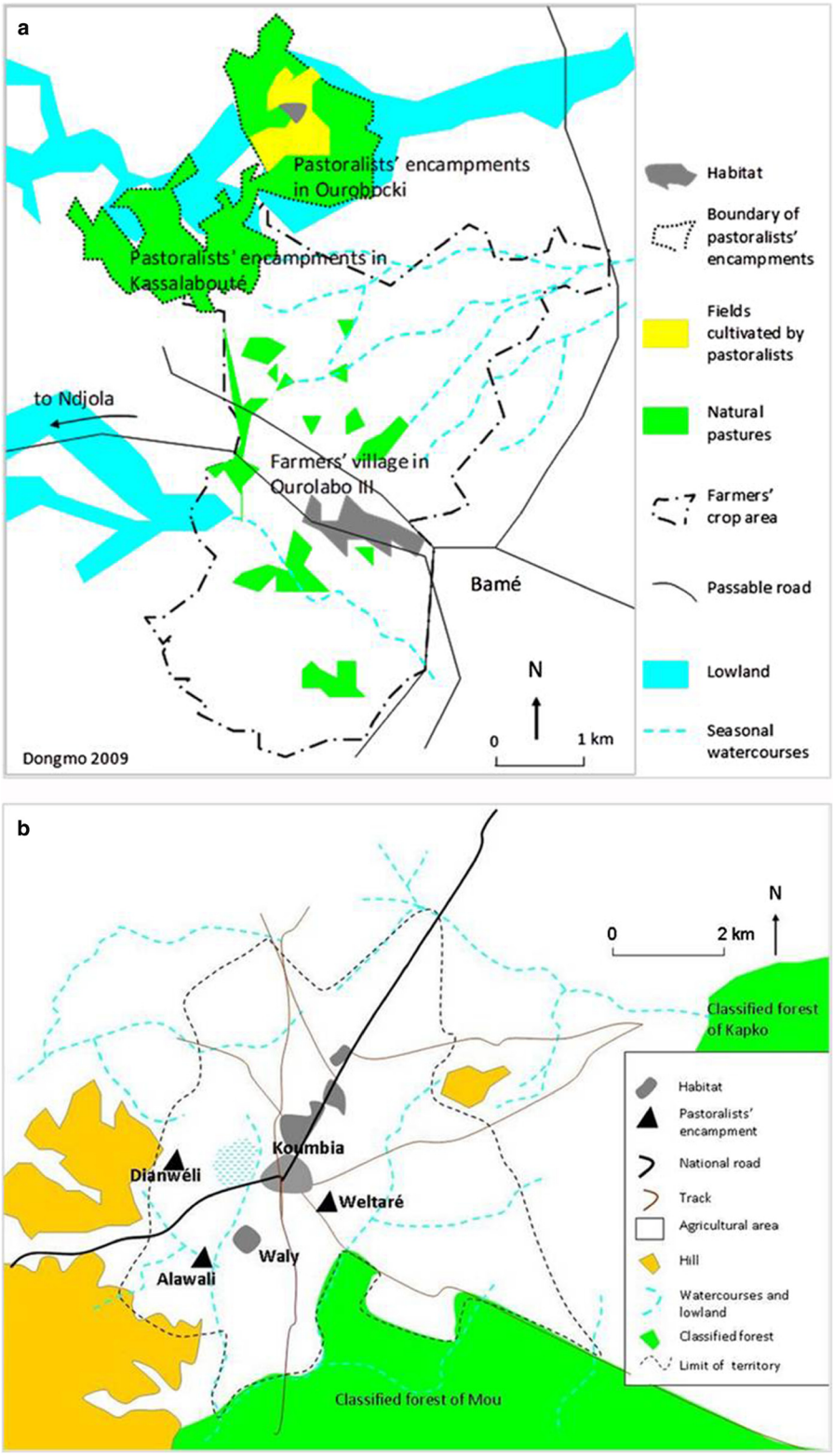

Figure 1 Village territories located in cotton-growing regions of Sudano-Sahelian Africa. (**a**) Territory of Ourolabo III: one crop farmer village with two pastoralist encampments. (**b**) Territory of Koumbia-Waly.

Analysis of operating practices of pastoral areas and resources

Herd management practices were studied in detail for two consecutive years (from 2006 to 2008) to understand how they were adapted to the high land saturation in the study areas and the local knowledge mobilized to achieve this. Fifteen cattle herds in Ourolabo III and ten herds in Koumbia-Waly were selected randomly, and all of the owners were willing to cooperate with the study. Each herd was followed for an entire day during each of the five pastoral seasons recognized by Fulani pastoralists and described by Dongmo et al. (2007) and Vall and Diallo (2009). GPS was used to collect data (latitude/longitude and hour) each time the herd entered a new pastoral unit as defined by the Fulani nomenclature (Dongmo 2009, p. 70). The data were analysed by combining a GIS (MapInfo) and a spreadsheet (Excel) to characterize the itineraries and the areas and modalities of daily grazing and to identify areas of potential conflict or tension between cropping and herding activities.

Finally, individual surveys were conducted among pastoralists to characterize herd transhumance circuits and relocation practices. The transhumance project planned by the pastoralist (owner of the herd) and his shepherd was characterized at the end of the hot dry season, a critical period during which they decide when transhumance should start. An assessment of the transhumance was made when the herd returned.

Results

Herding territories: which spaces, what status?

The herding territory is mainly composed of the following elements (Figure 2):

- The attachment territory - the main residence and adjacent fields
- The peripheral territory - rangelands grazed by herds on a daily basis, the area grazed changing with the seasons and forage availability
- Territories at a distance from the residential area corresponding to the following:
  - Livestock transhumance territories, defined by the transhumance itinerary, with areas grazed in successive stages (in each stage, the herd resides on a pastoral area for several days or weeks).
  - A relocation territory, on which part of the herd resides permanently and no longer returns to the attachment territory. This territory includes the residence of the shepherd(s), water points, and more rarely, fields cultivated by family members or hired labour. This production activity involving relocated livestock interacts with the original production unit located on the attachment territory through monetary and animal flows.

This spatial differentiation leads pastoralists to organize their herd into lots to ensure that their livestock may continue to fulfil their productive and socio-economic functions while correctly exploiting the pastoral resources of different components in the herding territory.

The first lot, called the house herd (*suredji*), consists mainly of dairy cows, calves and male bovines used for traction or intended for imminent sale. The house herd remains all year in the attachment territory and the peripheral territories nearby. Some animals of 'house herd' are kept near dwellings and fed intensively with cottonseed cakes and crop

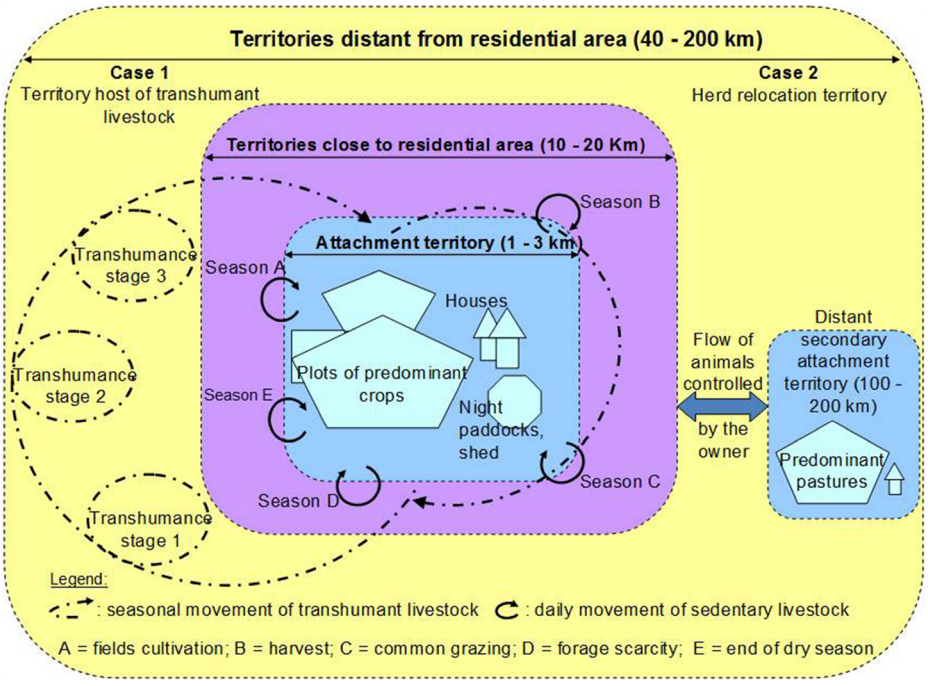

Figure 2 Herding territories and herd mobility.

residues for socio-economic purposes (Moritz 2010). This practice also is observed by crop farmers in the area who keep a few livestock (Faugère et al. 1990; Lericollais and Fall 1994).

The second lot, numerically the most important, corresponds to the transhumant herd (*horedji*), also known as the bush herd, which is composed of heifers, non-suckling cows, young bulls and bulls. This herd is moved over great distances throughout the year. The management of these two lots is based on the complementarities of different areas used by the pastoralists: the attachment territory, the nearby peripheral territory and the remote transhumance territories.

Attachment territory: family sedentarization area

Pastoralists generally prefer to settle down with their families in areas that they formerly used to graze livestock when they were still following a nomadic lifestyle. This frequently has led to the establishment of encampments or small villages that are located at a distance from farmers' villages to avoid disturbance by the herd. These encampments are recognized by customary authorities and state governments, and pastoralists consider these encampments to be their attachment territory because most of their families live there on a permanent basis.

Attachment territories generally cover a very small amount of land. The houses are permanent structures. Around the dwellings are cultivated plots (maize, sorghum and sometimes cotton), well enriched with animal manure, and enclosures or pens to keep animals at night, with livestock facilities (areas for vaccination, water well) located further away. There are few grazing sectors on the attachment territory; what does exist is reserved in the rainy season for small ruminants and for a small part of the house herd

(*suredji*). Crop residues from the pastoralists' fields are rapidly grazed at the end of the harvest as a strategic nutritional resource.

Although the pastoralists have been established in the attachment territory for some time and their rights to the land are officially recognized, pastoralists still consider that their usufruct rights to their lands' resources are precarious. The numbers of farmers are constantly increasing, and some exploit their status as well-known landowners to lay out their fields right up to the edge of the pastoralists' encampments, forcing livestock to move. In Ourolabo III, pastoralists were able to obtain official recognition of their attachment territory and have mobilized together to enforce respect of the boundaries and their usufruct rights. In this region, where land rights are held by Fulani *foulbé* (traders and owners of herds usually entrusted to certain Fulani *mbororo* shepherds), this territorial recognition was facilitated by the ethnic proximity between the *mbororo* pastoralists and the *foulbé* customary chiefs. In Koumbia-Waly, the land remains under the control of the indigenous Bwaba people, who are primarily crop farmers. The pastoralists' encampments are surrounded by fields that often obstruct access to pastures, water points and vaccination parks. However, with decentralization and the establishment of the rural communal council in Koumbia, which is responsible among other things for managing space and natural resources, pastoralists and their organizations are making efforts to integrate themselves into local development processes.

The attachment territory cannot ensure an adequate supply of feed for resident herds even during the common grazing period because there are only about 80 to 140 kg of crop residues/TLU in the dry season after harvest (12 to 21 days of grazing/TLU). A stocking density of 48 to 150 TLU/km^2 also is too high to maintain over the entire year. Pastoralists therefore must search for fodder resources in areas within the peripheral territories.

Peripheral territories

The peripheral territory (2 to 20 km from the *attachment territory*) is the rangeland area that is grazed daily by herds. It is characterized by the proximity that allows pastoralists to develop relationships with the communities that manage these areas, to share with them the pastoral resources (water, fodder) and to easily bring the animals back to the attachment territory to spend the night under guard. Access to the spaces and resources remains free, and pastoralists try to respect traditional rules. Herds' itineraries change according to the season and the availability of resources.

Fulani pastoralists divide the year into five periods to which they always refer when they speak about their herd management:

- *Ndungu* - rainy season (July to September) during which the fields are cultivated, reducing the space available for livestock movements.
- *Yamde* - harvest season (October to November) of the main agricultural products and by-products.
- *Dabunde* - cold dry season (November to February) during which the herds have the right of common grazing on rain-fed crop residues in the area.
- *Ceedu* - hot dry season (March to April) characterized by a progressive, quantitative and qualitative decrease in rain-fed crop residues over the course of the season.

– *Seeto* (northern Cameroon) or *gataaje* (western Burkina Faso) - transition between the end of the dry season and the beginning of the rainy season (May to June).

The availability of water and fodder varies with each season, as do the frequency of conflicts with farmers. Pastoralists apply specific herd management rules on the different types of spaces used according to this calendar (Vall and Diallo 2009; Dongmo 2009).

Pastoral units inside the peripheral territories

Pastoralists distinguish different landscape units and manage them differently. Their use varies with the seasons and depends on the accessible resources available to nourish the herds that travel through them (Table 1). *Ladde* is a zone without cultivated fields or housing where grass, woody forage and water are very common. *Ladde* represents a wide range of landscapes that pastoralists break down into specific pastoral units based on their very detailed knowledge of the flora.

There are three types of hill pastoral units (*ferlo*, *fukkaawo*, *yolde*) which are grazed in the rainy season. They also serve as 'refuge' areas that hinder animals from entering nearby crop lands and thus limit the damage animals may cause.

Pastures on dry plains (*seeno*) consist of marginal land attributed to livestock. They are very rare due to land saturation and are frequented by animals throughout the year depending on their accessibility. In northern Cameroon, these grazing plains usually also include areas that have lain fallow for three or more years because of their low production potential, which may not allow their further cultivation. In the territory of Ourolabo III, a larger grazing area was officially demarcated and recognized by the population as *hurum* (an area legally assigned for animal production by the

Table 1 Fulani pastoral units in western Burkina Faso and northern Cameroon

	Western Burkina Faso	Northern Cameroon
Hill grazing	*Ferlo*	
	Tree and shrub savannah	*Yolde*
	Fukkaawo	Tree, shrub and grass savannahs in the hills
	Shrub and grass savannah	
Dry plains grazing	*Seeno*	*Yolde*
	Tree and shrub savannah	3 years fallow and more
Grazing of lowland and floodable zones	*Cofol*	
	Riverside formations	*Fitare*
	Bolaawo	Tree, shrub and grass savannahs bordering permanent watercourses
	Tree and shrub savannah	
	Bomboru	
	Tree savannahs and clear forests	
Crop areas grazing		*Sabeere*
	Sonyere	Uncultivated fields for 1 year
	All set-aside plots	*Toumbere*
		Fallow for 1 to 2 years
	Nguessa	*Nguessa*
	Fields grazed after harvest	Fields grazed after harvest

administration or by the customary authorities). The grazing areas classified as *hurum* in saturated areas are very rare in northern Cameroon.

The lowland pastures and floodable zones named *fitare* in Ourolabo III always border permanent water courses or floodable valleys. These areas are deliberately excluded from crop production by pastoralists who prefer to keep them as grazing spaces to compensate for the continuous reduction of pastoral land. In Koumbia-Waly, they are very diverse, ranging from areas with high pastoral interest (*cofol*, forested areas along water courses which are rich in forage) to those with low pastoral interest (*bolaawo* and *bomboru*) according to local knowledge and perception. Their use for grazing is now threatened by vegetable crops.

Fallows (*sabeere* and *yolde* in northern Cameroon and *sonyere* in western Burkina Faso) consist of spaces set aside to improve the fertility of the soil before being cultivated again. These fallows (in the strict sense) are now disappearing in Sudano-Sahelian zones. For example, fallows represent less than 5% of arable land in the territory of Ourolabo III. Other plots that have not been cultivated due to a lack of time or labour correspond to annual fallows (*toumbere* in northern Cameroon). These annual fallow areas, which are situated between cultivated plots, are highly valued by pastoralists for their forage richness.

The plots cultivated during the year (*nguessa*) provide weeds and mostly crop residues that either are grazed directly on the plot during the common grazing period or are cut and fed to the animals in troughs.

The natural tracks (*burti* and *laawi*) used as passages for animals being moved from one place to another also serve as small grazing areas. Their cultivation, totally or partially by crop farmers, is becoming more frequent.

At Koumbia-Waly, the crop field areas (*nguessa* and *soynere*) cover about 52% of the total village territory and about 6% of the land adjacent to riverbanks (*cofol*). The remainder (42%) is covered by hill pastures, with *ferlo* (tree and shrub savannah) accounting for about 6% and *fukkaawo* (shrub and grass savannah) 36%. The territory of Ourolabo III is dominated by the agricultural area (70%), while plains and lowland pastures occupy 25% of the space. Fallows are marginal (5% of the land).

Some main characteristics of grazing in the study areas are presented in Table 2.

In the peripheral territories, animals must travel from 7 to 11 km daily to find forage and water, which takes 8 to 9 hours. In the rainy season, shepherds move herds often during the day because they must rely on a large collection of small and scattered grazing areas. In Koumbia-Waly, the herds mainly graze on the hills during the rainy season and at the end of the dry season. In contrast, in Ourolabo III, livestock move little during the hot dry season (*ceedu*) and confine themselves to the depleted lowlands that are close to houses.

Similar lowlands in Koumbia are mainly frequented during the rainy wet period (*ndungu*). In Ourolabo III, animals navigate through the interstices (areas between crop plots) or away from the main cropping area to access pastures that are very far from the territory. Grazing is done almost exclusively on the harvested fields during the dry cold season in the two territories.

Herding in the peripheral territories during rainy season and harvesting season

During the rainy season (*ndungu*), forage resources are abundant, but the risk of conflict between pastoralists and farmers is high. While pastoralists feed their herds on

Table 2 Characterization of daily grazing, according to seasons, in northern Cameroon (Ca) and western Burkina Faso (BF)

	Gataaje		*Ndungu*		*Yamde*		*Dabunde*		*Ceedu*	
	May to June		July to Sept.		Oct. to Nov.		Nov. to Feb.		March to April	
	Ca	BF	Ca	BF	Ca	BF	Ca	BF	Ca	BF
Total grazing duration (h)	8.2	9 to 10	7.9	9 to 10	8.1	9 to 10	8.2	9 to 10	8.9	9 to 10
Distance travelled per day (km)	7.0	7	9.8	7	8.6	8	9.8	10	8.3	11
Contribution of hill units (% DT)	5	24	5	16	0	1	0	2	0	35
Contribution of plains units (% DT)	59	58	95	57	95	63	80	95	77	63
Contribution of lowland units (% DT)	36	18	0	27	5	36	10	3	23	2

DT, distance travelled.

natural rangelands, they also allow them onto areas between cropped plots (Figures 3 and 4). During this period (*ndungu*) in Ourolabo III, 62% of the total distance travelled by a herd during one day is located in recognized pastoral areas (24% on herd trails and 38% on pastures demarcated and classified as *hurum* and hills), 27% on uncultivated areas close to or between fields and 11% on other areas. In Koumbia-Waly, fallow (*soynere*) and hill pastoral units (*ferlo*, *fukkaawo*) are the most travelled by livestock because they are relatively far from cropped areas.

Livestock management on the interstices is very complicated because the area available for animals to move is very narrow. The risk of crop damage is high, and conflicts between pastoralists and crop farmers are more frequent. In northern Cameroon, pastoralists are determined to use these areas for grazing because their forage value is higher than what is available in the hills.

During the harvest season (*yamde*), the time spent grazing on cropped plots and the interstices increases considerably (Figure 3), and the frequency by which herds damage crops increases as well. In Ourolabo III, pastoralists first graze their herds on the crop residues left on harvested plots belonging either to themselves or to 'friendly farmers'.

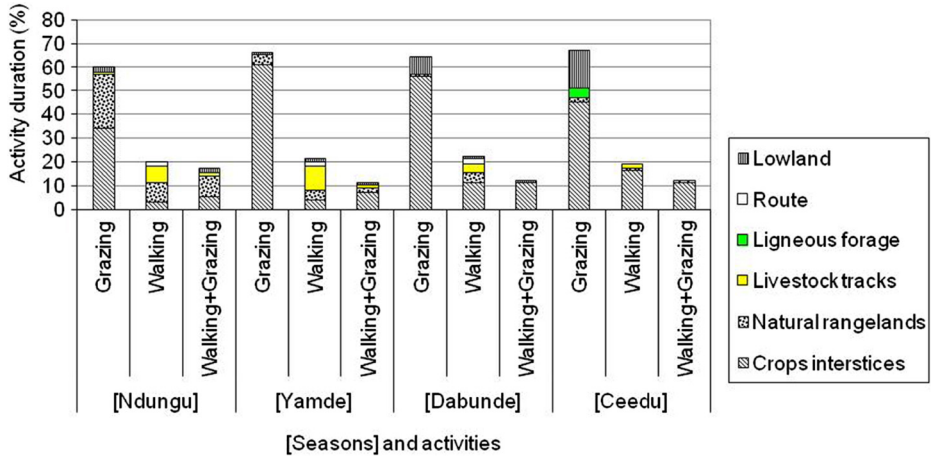

Figure 3 Duration of herd activities in the pastoral units of the attachment and peripheral territories, respectively. The graph shows the pastoral units visited during a grazing day, in each of the four main seasons, in northern Cameroon.

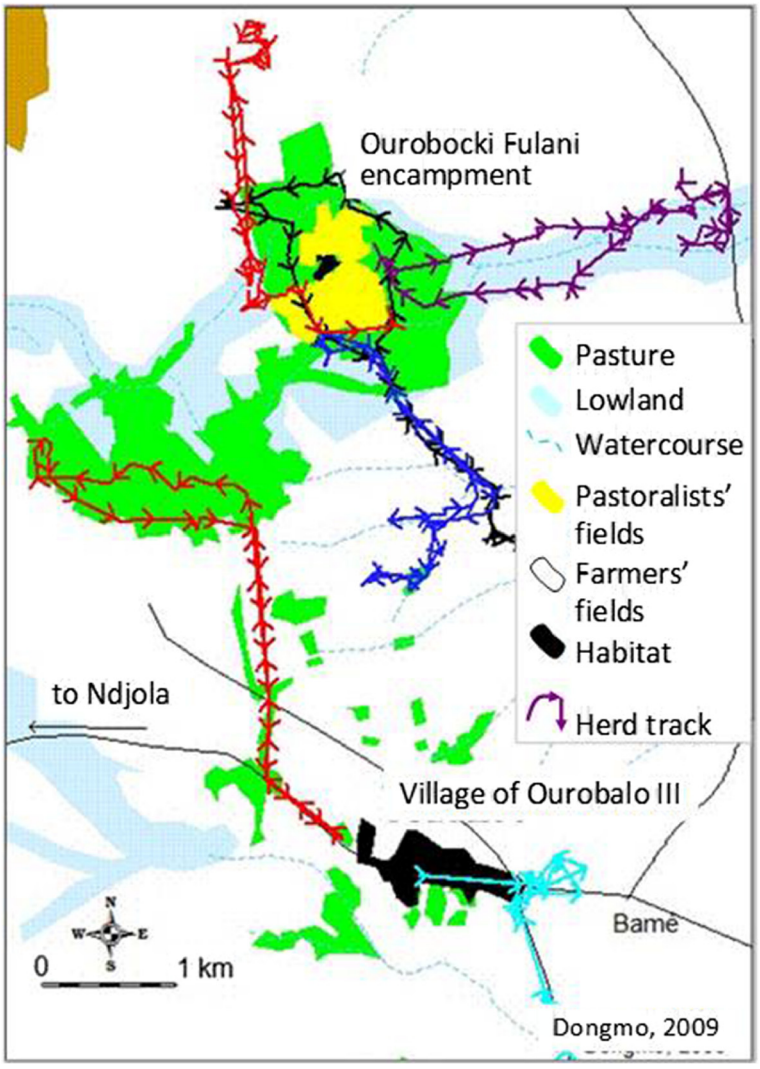

Figure 4 Daily travel routes of six herds in the rainy season. The routes are from *ourobocki* Fulani encampment (Ourolabo III) in northern Cameroon.

In contrast, in Koumbia-Waly, pastoralists send their herds into the hills during the harvest season even though the annual herbaceous plants found there have completed their growth cycle and there is little food available due to the degeneration of biomass. Grazing is mainly done on the lowlands (*cofol*) and secondarily on the fallows (*soynere*) that have lost much of their forage value due to overgrazing and the scarcity of water. While waiting for the harvest to be completed, some pastoralists install temporary night-time livestock parks on the hills (*ferlo*) away from the fields to reduce damage risks. At the end of *yamde*, the first harvested fields that have forage crop residues (*nguessa*) progressively are visited and used by the livestock.

In Ourolabo III, common grazing rights are more established for pastoralists, who do not hesitate to exercise these rights from the start of the harvest (*yamde*), relying on the clemency of the traditional leader if there is damage. In Koumbia-Waly, this right is controlled by traditional authorities (e.g. members of the farmers' native Bwaba ethnic

group) and takes effect on a date known in advance in order to allow crop farmers to store sufficient crop residues collected from their own fields.

In both areas, pastoralists collectively protest against the fragmentation of rangelands and monopolisation of land by crop farmers. In northern Cameroon, the tactic regularly used to affirm or re-affirm their access rights is to guide herds to the crops that have been cultivated on areas that traditionally were respected as livestock rangelands and courses. In both areas, rangelands are the collective domain of the village (the commons), and therefore they are not attributed to individuals or groups of users. However, there is a lack of collective organization and coordination among pastoralists, and they do not invest in the improvement of herbage potential or in the management of the rangelands that they use collectively.

Herding in the peripheral territories during the dry cold season

Once harvesting is finished, sedentary and transhumant herds that have returned to the attachment territory first eat crop residues on the pastoralists' own fields, followed by the fields of neighbouring farmers. During the cold dry season (*dabunde*), the majority of grazing takes place on crop fields (farmers' fields) to make use of crop residues (*nyayle*) (Figure 3). Pastoralists actively seek areas where these residues are abundant to support the reconstitution of livestock body reserves and the milk production of cows with calves. In Koumbia-Waly, the practice of night grazing, which had been abandoned since the beginning of the winter season, resumes. With the drying up of surface water sources, water only is available in watering points dug in the lowlands and in the fields. During this period, herd owners also can count their animals, consult with shepherds and apply animal fertiliser from herd paddocks on cultivated plots.

In the two villages studied, the date of opening the fields for common grazing is not set in a collective manner. Pastoralists first use their own crop residues, followed by those of farmer 'friends' who keep them informed about which plots have been harvested. The law authorizes the common grazing of fields after crops have been removed. However, farmers who also own animals consider that their animals have priority rights over the residues on their own fields. To obstruct the entry of pastoralists' herds, some farmers take the risk of storing the harvested cotton crop on the field as long as possible. Given this situation, in Ourolabo III, pastoralists follow very closely the progress of crops harvested and do not hesitate to bring their herds to the fields at night without permission as soon as the crop has been cleared. Pastoralists consider crop residues as a recompense for the fodder lost when rangelands are cleared for cultivation by farmers.

Territories distant from the residential area

Host territories for herd transhumance

At different times of the year, transhumant herds are led to host territories located relatively far away from the attachment and peripheral territories (Figure 2). Travel time to these host territories ranges between one to four days. Accessing these territories is increasingly difficult, with the shrinkage or disappearance of animal tracks and with many risks along the roads. In Burkina Faso and Cameroon, transhumant pastoralists have a transhumance certificate, issued by the Livestock Services, stating the composition of

the herd and the main stages of displacement. They can present this document to the various Livestock Services posts while they remain in the country (Burkina Faso) or in the *Lamidat*[a] in which they are members (Cameroon). However, on the transhumance territories, the transhumant pastoralists are considered to be 'foreigners' and must pay a fixed fee for access to resources. In Cameroon, the *Sarkin saanou* (the traditional minister of livestock activities) is always present at the reception areas and knows the itinerary of the transhumant pastoralists, from whom he receives a fee of 20,000 to 40,000 Fcfa (39.5 to 79.0 US dollars) per herd according to a herd's size and certain socio-economic factors. The fee can become symbolic when the pastoralist is a native or regularly comes to the *Lamidat* (kola nuts or gifts with a value of 5,000 Fcfa) (9.8 US dollars) and especially when, voluntarily or upon the request of the *Lamidat*, the pastoralist contributes financially or materially to local development.

Nowadays, two types of transhumance are practised in the villages studied (Figure 5): 'short-term transhumance in the dry hot season', and 'long-term transhumance that is extended until the dry cold season'.

Short-term transhumance in the dry hot season: 'minor transhumance'

When crop residues have been completely grazed, and especially when finding water for the herd becomes particularly problematic, some pastoralists decide to send their herds on transhumance. Pastoralists with medium-sized herds practise transhumance for short periods of time (February to June) over short distances on the peripheral territory during winter. This transhumance ends when water and pasture resources in the attachment and peripheral territories are renewed after the start of the rains. This type of transhumance often involves the entire herd (*horedji and suredji*).

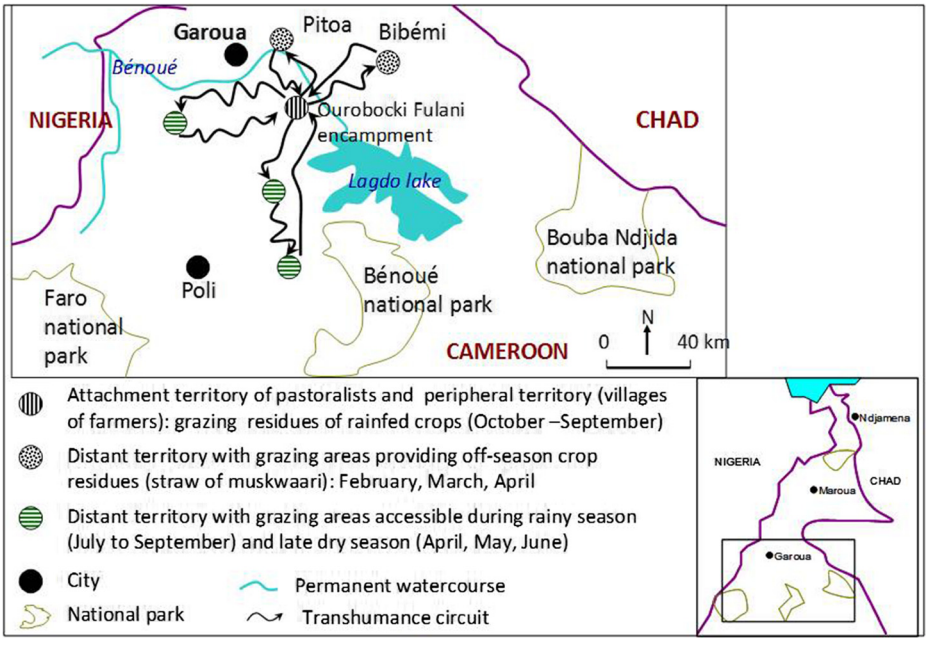

Figure 5 Transhumance circuits of bovines from *ourobocki* Fulani encampment (Ourolabo III) in northern Cameroon.

For the pastoralists of Ourolabo III, this type of transhumance brings herds into areas where sorghum (*muskwaari*) is produced off season, irrigated rice areas that are harvested in February and floodable zones with large areas of natural pasture. These different areas are located 40 to 75 km away from the attachment territory. When the conditions at the end of the dry season become too limiting (April), some herds are led south for a month to take advantage of the early rains. In Koumbia-Waly, herds are led towards the south-west where rainfall arrives earlier. When the animals return to the attachment territory (May, June, July), they are penned during the night in their owner's fields to contribute animal fertiliser which is essential for cereal production.

These transhumance areas do not have the legal status of pastoral areas and are cultivated and flooded in the rainy season. However, their role is fundamental for herding. Their pastoral status remains precarious, and they are not protected from the production of off-season crops (vegetables, rice, etc.). Securing access to these areas during the dry-season grazing periods would require the establishment of agreements between traditional authorities, the administrative services concerned and federations of pastoralists and farmers; this type of dialogue is difficult to initiate. In addition, the straw of *muskwaari* sorghum, known for its forage quality, is increasingly harvested by farmers for sale or to feed their own animals.

Long-term and long-distance transhumance: 'major transhumance'

The small size of rangelands resulting from the extension of cultivated areas in the attachment and peripheral territories forces the owners of large herds (80 heads or more) to make a long-term transhumance (the entire rainy season) towards much more distant areas (75 to 100 km) which are recognized or delimited as rangelands (*hurum*) by the administration or traditional authority. The transhumance itinerary has several stations where animals remain for a few days to several weeks or even months. The long-term transhumance is practised until the end of the rainy season in areas where large rangelands remain on the plains (*hurum*) or in the hills which are difficult to cultivate.

Host territories for herd relocation

Some pastoralists who regularly bring their transhumant herds to a certain area, and who become socially well-integrated there, eventually maintain part of their herd in that area on a permanent basis. This reduces the risks and constraints associated with long-distance annual movements. Livestock are entrusted to a shepherd, usually a family member, who installs himself in a quasi-permanent manner on the site. These groups of animals, known as 'relocated herds', no longer return to the original attachment territory. Weaned calves and dairy cows accompanied by their calves are regularly exchanged between the relocated and house herds. If the new host territory turns out to be interesting, shepherds from the same clan, or even from a large family, establish families there (marriage, repatriation of women and children) and develop a new attachment territory.

In addition to being an animal production strategy, the relocation of a herd is part of a strategy to establish members of pastoralists' families in new areas and to secure and increase the value of their livestock. However, the relocated herds often are managed using the same extensive livestock practices as those followed in the original attachment territory. These practices rely on herd mobility and the use of shared rangelands

and resources (collective rangelands, crop residues and common grazing). This relocation strategy reproduces the original production system without seeking to innovate or invest in it through the cultivation of fodder crops or the improvement of rangeland quality. The areas where herds are relocated increasingly tend to be near protected areas, which raises the question of positive or negative interactions between the wild biocenosis and livestock (Niamir-Fuller et al. 2012). Unfortunately, few studies have examined these impacts in northern Cameroon, where protected areas occupy up to 33% of the total area.

The sustainability of such a strategy is questionable because there are fewer pastoral areas that can receive and relocate transhumance herds, and it is becoming increasingly necessary to intensify agriculture and animal production to maintain the productivity and sustainability of agricultural and pastoral activities.

Strategies of pastoralists for managing herds and territories

At present, there are three types of animal production and socio-economic integration strategies that coexist and contribute to the definition of the three types of herding territories characterized previously (Figure 6).

The first, the 'sedentary' strategy, concerns the owners of small herds whose animal production activity is confined to the attachment territory and the peripheral territory. This covers the largest number of cases because it concerns a very large number of farms, including farmers who own draught animals and pastoralists and agro-pastoralists who own small herds (about 80% of farms in Koumbia-Wally, Burkina Faso and 30% in Ourolabo III, Cameroon).

The second, the 'mixed' strategy, is based on transhumance. It concerns the owners of medium-sized herds who practise minor transhumance and the owners of large herds that practise major transhumance.

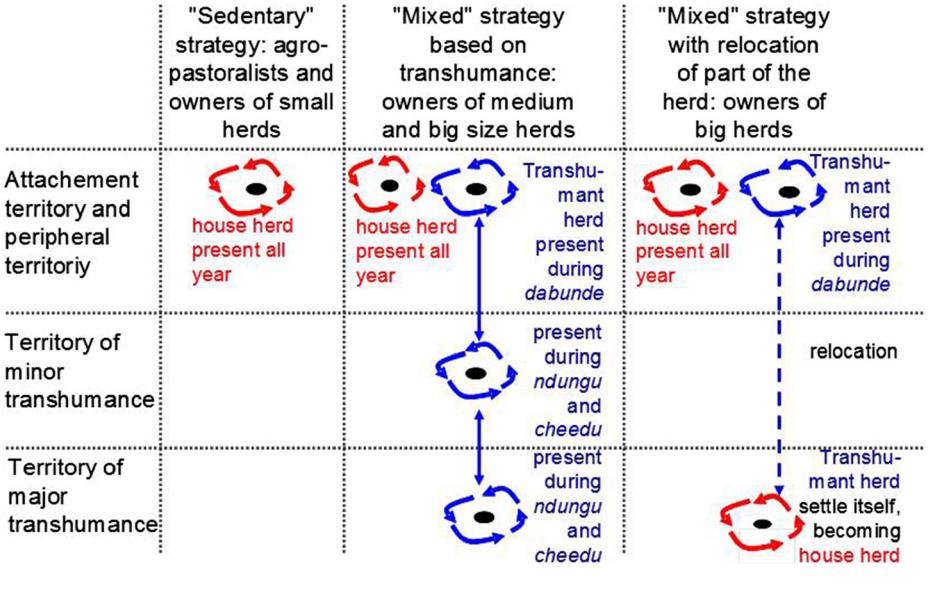

Figure 6 Diversity of herding territories and management strategies.

Finally, there is the 'relocation' strategy, concerning owners of large herds who already have relocated part of their herd in a territory far from the attachment territory, where they have built the equivalent of a secondary residence and installed part of their family. In such a situation, livestock mobility is organized between the relocation and attachment territories, with occasional transhumance periods between the two residential areas. Constant flows occur between the two herds (*suredji* and *horedji*) according to the physiological state of the animals and the economic needs and choices of the pastoralist.

Discussion

The diversity of territories, practices and strategies

The two cases presented in this article demonstrate the complexity of the spatial arrangements that pastoralists have to consider over the course of the year. The study confirms that the task of keeping their animals alive, and in so doing, ensuring their subsistence, is not a simple one. According to Weber and Horst (2011), 'Pastoralism may be perceived as demanding only minimal skills. The shepherd or herdsman simply keeps his stock alive so that he may subsist on the animals' milk, blood, wool, meat, and value in trade. Just beneath this thin veneer, however, rests a myriad of complexities involving forage, animal health, reproduction, predation, weather, and the social and cultural fabric within which the pastoralist functions'. Moritz observed that the peri-urban pastoralists involved in intensive strategies 'did not intensify their production system to increase production for household subsistence or marketing', but 'to get their cattle through the dry season crunch and prevent a decline in animal production and reproduction'. Intensification was a response to population pressures on natural resources that led to the disappearance of rangelands (Moritz 2010, p. 124). Although they have settled down, the Fulani pastoralists of northern Cameroon and western Burkina Faso have to continuously develop and adapt their survival strategies, which include fighting for rights of access and the use of space and resources.

Depending on the region, pastoralists' usage rights are more or less well recognized at the level of the attachment territory. Pastoralists' organizations work for the recognition and respect of territory contours to acquire universally recognized usufruct rights. In these types of territories where pastoralists have obtained land use rights and, more rarely, property rights recognized by all, technical innovations are adopted and implemented gradually. Pastoralists tend to locate their limited livestock-related equipment (livestock and vaccination pen, wells and a borehole) on the attachment territory. They currently wish to secure rights to more land around their homes in order to plant corn because they can achieve high yields with the fertilizer provided by their animals. They also are considering planting forage crops, but in their own view, it is difficult to cultivate both forage and corn due to the limited amount of arable land available. Action research testing the association of cereal and forage on the same plot has convinced pastoralists that it is possible to increase forage yields without reducing grain yields (Nchoutnji et al. 2010). However, this innovative technique alone cannot resolve all of the challenges facing pastoralists, who need institutional, socioeconomic and technical support.

In the peripheral territories, pastoralists are fighting for the preservation of common grazing rights and the cessation of clearings to preserve the natural pastures that

remain in the highlands, lowlands and on the plains between the areas already under cultivation (livestock track, interstitial rangelands).

In both areas studied, pastoralists have to negotiate the right to common grazing on all or part of the areas cultivated by farmers. With regard to common areas, there is no law protecting these areas from being cleared for agricultural use. Pastoralists consequently cannot make a legal appeal when they notice the disappearance of a pasture. The installation of livestock tracks, rights of passage and grazing areas are rarely established in legal terms, so when these areas are taken over for crops, pastoralists have no choice but to move elsewhere.

Support for pastoralists also should include incentives for the partial and gradual intensification of livestock production systems. For pastoralists to accept such a change in their livestock production practices, numerous technical (management of forage intensification, etc.), economic (access to inputs and services, market security, etc.), political and legal issues (securing access to land, support for pastoralists' organizations, etc.) must be addressed. The combination of extensive and semi-intensive livestock production systems, at the level of the pastoral production units, constitutes an avenue worth exploring, but this also involves both better access to and the concerted management of resources in the territories involved.

The management of herding territories could be facilitated through a dialogue process involving all those with a stake in the surrounding rural areas (farmer communities, traditional authorities, public services, rural development projects, etc.). Current processes of decentralization are making it possible to develop localized consensual rules for the management of agro-pastoral and natural resources, such as the development of local conventions and local land charters, as was done in the commune of Koumbia. However, the major challenge for pastoralists who own large herds is to maintain the right to use transhumant territories. This involves negotiations at a regional (provincial) level between the various users and managers of these areas.

The relevance of laws

The laws and codes related to livestock developed by governments in the region and regional institutions (Economic Community of West African States (ECOWAS); Economic Community of Central African States) were oriented to support the maintenance and development of more productive livestock in strongly pastoral areas: Inner Niger Delta in Mali, Plateau of Adamawa and floodplain of Diamaré in Cameroon, etc. However, major changes have been taking place over the last 30 years: in some areas where pastoralism was once dominant, livestock farming has declined while crop production has increased, and in some predominantly agricultural regions (northern Cameroon, western Burkina Faso), pastoralists have settled with some of their animals. The latter is what is taking place in our study areas as well as in large areas in the south of Senegal and Mali, eastern Guinea and the north of Ivory Coast, Benin and Togo. The key challenge for development in these areas is establishing conditions under which pastoralists, farmers, and other actors can coexist peacefully.

Effective collective action and suitable laws and regulations are needed if pastoralism is to be developed so that it can adopt technical innovations while cohabitating with agriculture. An analysis of the new pastoral law of Burkina Faso (Law No. 304-2002)

and of the pastoral code of Cameroon, which was updated in 2010, shows that the legal arsenal needed to manage this cohabitation already exists. However, the implementation of these pastoral laws is not a simple task. Firstly, it is compromised by the disconnection between these laws and the realities of rural life. For example, in Burkina Faso, Cameroon and most West African countries, these laws set the minimum width of cattle tracks (typically 50 m). This disposition, however, will never be respected by farmers in the present context defined by a shortage of land. Another example concerns tree trimming, which is prohibited by law yet which is an essential practice for pastoralists to provide basic energy and nitrogen necessary for their livestock at the end of the dry season (Smektala et al. 2005). Secondly, these pastoral laws were designed primarily for the Sahel in order to preserve large areas of rangeland in a zone traditionally devoted to livestock.

The updating of the pastoral code in Cameroon benefited from the active participation of Mbororo pastoralists and leaders of their association (Mbororo Social and Cultural Development Association). One major action related to this code will be to solve long-standing conflicts between farmers and herders and ensure the rights of Mbororo pastoralists on their pastures.

These pastoral laws are perfectly in line with the African Union's 2011 pastoral policy and the action plan for livestock adopted the same year by ECOWAS. They recognize the right of pastoralists to move their herds from one region to another, protect their access to water in areas dominated by agriculture and facilitate cross-border trade. In many other countries (e.g. Nigeria, which faces additional constraints), pastoral policies need to be accompanied by national action plans capable of changing behaviours and practices regarding pastoralism (Ibrahim 2012).

Regulations regarding common grazing are very clear in the pastoral laws in Cameroon and Burkina Faso, and are very important in a context where competition for crop residues is intense. They also provide a legal framework for the establishment of local conventions (Djiré 2004; Granier 2006; PACT 2008) and therefore represent a good opportunity for pastoralists to implement local rules regarding the management of strategic resources (pond, grasslands, vaccination parks, prescribed burning). Unfortunately, pastoralists often are considered to be non-natives and immigrants and thus are under-represented in local decision-making bodies (municipal councils).

Laws relating to livestock farming, and more generally to the use of natural resources, can be improved further. However, their application remains difficult in a context defined by major staff shortages and a lack of innovative approaches (explanation of laws for rural actors, training of public services agents, participatory adaptation of laws for different contexts). The application system of customary law based on 'control, observation, repression' has shown its limitations, especially in situations where corruption is rampant (Cameroon). In this case, pastoralists, due to their capacity to earn money quickly through the sale of some animals, are often taxed in a heavy and arbitrary fashion (Kossoumna et al. 2011). In other situations (western Burkina Faso, southern Mali), farmer-herder conflicts are resolved locally by traditional authorities representing the various communities without reference to laws and regulations. In this case, conflicts are resolved but problems remain. Although the decentralization of state services is effective, the surface area of a territory and the population to be 'administered' are often too large in relation to the human and material resources available.

Decentralization laws recently were enacted in most West and Central African countries (e.g. Law No. 034-2009 Burkina Faso). They establish a new form of power, municipal or communal councils which are democratically elected but often are connected with a customary local power. Depending on the country, rural communities have acquired a certain autonomy *vis-à-vis* public administrative and technical structures, but their action is limited by a lack of staff and financial resources. Property taxes have not yet been implemented due to the complexity of land ownership, and rural communities only receive state subsidies and some market taxes. However, rural communities in Mali and Burkina Faso have become major actors in the management of natural resources. It is their responsibility to develop local charters for the management of these resources (communal land charter in Burkina Faso). It is within this framework of intervention, which also includes national laws, that rural development agents and support structures should develop innovative approaches.

With the emergence of local government based on democratic principles, the centres of decision are being displaced. Government and traditional authorities will have to share power with newly elected institutions (Cotula and Cissé 2006). The qualities and capabilities of these new governing bodies will be critical to the effective implementation of the innovations needed to maintain livestock farming in these areas. A universally recognized process of election and democratic decision will depend on the recognition of different professional groups and their participation in councils, the honesty of leaders and some financial autonomy for rural communities. Pastoralists will have to work with these new forms of rural governance to develop, adapt and renew their production systems.

Conclusion

The herding territory concept presented in this article was developed in response to the complexity of pastoralism in Sudano-Sahelian Africa and is proposed as a tool to be used when designing sustainable livestock systems in Sudano-Sahelian Africa. The herding territory is a kind of 'action-space' (Painter et al. 1994) that could be used by decision-makers and stakeholders to ensure social equity (taking into account the needs of pastoralists) in a context where management of natural resources is being passed to newly formed local authorities. Mobilizing this concept also involves considering and combining scientific and local knowledge, as well as interdisciplinary approaches (biosciences, social and economic sciences), to better understand institutional and legal frameworks, global practices and the strategies and knowledge of pastoralists.

Endnote

[a]Greater traditional court headed by a *Lamido* and grouping several village territories.

Competing interests
The authors declare that they have no competing interests.

Authors' contributions
ALD contributed to the acquisition, analysis and interpretation of data. ALD has also drafted and revised the manuscript. EV contributed to the analysis and interpretation of data and the revision of the draft and the manuscript. MAD contributed to the acquisition, analysis and interpretation of data and the drafting of the manuscript. PD contributed to the drafting and critical revision of the manuscript in all the stages. AN contributed to the paper by improving the methodology of the acquisition of data in northern Cameroon and to the critical revision of the manuscript by improving the 'Discussion' section. JL contributed to the acquisition, analysis and interpretation of data

(as Ph.D. thesis director of ALD and MAD), drafting and revision of the manuscript. All authors have read and approved the final version.

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